Combination computer battery pack and port replicator

FIELD OF THE INVENTION

[001] The present invention relates generally to portable computers.

BACKGROUND OF THE INVENTION

[002] Portable computers are increasingly popular among mobile professionals. Often, when a user of a portable computer is away from an office, the computer is used in a standalone configuration, with few or no peripheral devices attached. In keeping with this kind of use, a portable computer often has few connection ports available for connecting peripheral devices. During such out-of-office use, the computer typically runs on battery power, and battery capacity is an ongoing limitation on the usefulness of the computer, especially on how long the computer can be used before recharging. Auxiliary external batteries are available for some computers so that the out-of-office working time can be extended.

[003] Peripheral devices are increasingly being developed for portability as well. For example, battery-powered printers are now available. Some peripheral interfaces such as the Universal Serial Bus (USB) and the IEEE (Institute of Electrical and Electronics Engineers) 1394 "Firewire" interface enable a peripheral device to draw its operating power from the interface itself, thus eliminating the need for a separate power connection to the peripheral device. For example, USB-powered digital cameras, scanners, and mass storage devices are already available.

[004] A computer user may wish to use several peripheral devices while out of the office, but may be hindered by two problems. First, the user may be limited by the number of connection ports available on the computer. Second, if the peripheral devices are powered over their communication interfaces, the peripherals draw their

power from the computer batteries, thus exacerbating the problem of limited battery capacity.

[005] Often, for in-office use, the computer is plugged into a docking station, or port replicator. Typically, a docking station provides power from a wall socket for recharging the computer batteries, and may also provide additional connection ports for peripheral devices. While a docking station provides a convenient way to use a portable computer in an office setting, docking stations may be awkward to transport, and do not address the problem of limited battery capacity when the computer is used away from an office.

SUMMARY OF THE INVENTION

[006] Embodiments of an accessory for a computer provide both an auxiliary battery and a port replicator in an integrated unit. In one embodiment, the accessory comprises a docking connector, a battery, and at least one communication port, with the battery and communication port connected to the docking connector so that power from the battery and communication signals to the communication port can pass through the docking connector.

BRIEF DESCRIPTION OF THE DRAWINGS

[007] Figure 1 shows a computer accessory in accordance with an example embodiment of the invention, poised to connect to a portable computer.

[008] Figure 2 shows the computer accessory of Figure 1, connected to a portable computer.

[009] Figure 3 shows a cutaway perspective view of the interaction of hook features, receiving features, and release pins for attaching the accessory of Figure 1 to a portable computer.

[0010] Figure 4 schematically shows an exemplary way connections inside the computer accessory of Figure 1 may be made, and their interactions with example internal components of a computer.

[0011] Figure 5 depicts a computer accessory in accordance with another example embodiment of the invention.

DETAILED DESCRIPTION

[0012] Figure 1 shows a computer accessory **101** in accordance with an example embodiment of the invention, poised to attach to a portable computer **102**. Computer accessory **101** comprises an internal battery **103**, schematically shown in broken lines. Battery **103** is preferably a rechargeable battery, is made up of at least one cell, and may be of a shape different than the generally cylindrical shape shown in Figure 1. Wiring connections inside computer accessory **101** are omitted in this view for clarity.

[0013] Computer accessory **101** also comprises at least one communication port. By way of illustration, the computer accessory shown in Figure 1 includes three Universal Serial Bus (USB) ports **104, 105,** and **106**, a modem port **107**, and a local area network (LAN) connection **108**. Other combinations of communication ports could be used. For example, more or fewer USB, LAN, or modem ports could be included than are shown in Figure 1, or other kinds of ports could be included, such as one or more RS-232 (Recommended Standard 232) serial ports, IEEE 1284 parallel ports, IEEE 1394 "Firewire" serial ports, Small Computer System Interface (SCSI) ports, or other kinds of data communication interfaces. Communication ports may be located on other faces of computer accessory **101** instead of or in addition to the face shown in Figure 1. Computer **102** is shown in Figure 1 in an idealized fashion for

simplicity of explanation. An actual computer used with computer accessory **101** may also comprise communication ports.

[0014] In one example arrangement, the communication ports on computer accessory **101** replicate ports on computer **102**. Computer accessory **101** then comprises a port replicator, and also comprises an auxiliary battery for computer **102**, the port replicator and the auxiliary battery being integrated into a single unit. Computer accessory **101** need not comprise the same number of communication ports as the computer it is connected to comprises.

[0015] Computer accessory **101** also includes a docking connector **109**. Docking connector **109** has multiple contact points so that it can carry multiple independent signals. In this example embodiment, docking connector **109** has contacts for transmitting power from battery **103**, and contacts for carrying communication signals between computer **102** and the communication ports. Docking connector **109** may be of a standard type available in the industry, or may be specifically designed for this application.

[0016] Computer accessory **101** also comprises housing **115**.

[0017] In the example embodiment shown in Figure 1, computer accessory **101** mechanically attaches to the bottom of portable computer **102** using hook features **110**. Hook features **110** engage receiving features **111** on portable computer **102**. In the process, docking connector **109** engages mating connector **112**, making an electrical connection between computer accessory **101** and portable connector **102**. Mating connector **112** has contacts complementary to the contacts on docking connector **109**, and enables computer accessory **101** to exchange signals with portable computer **102**. Figure 2 shows computer accessory **101** attached to the bottom **117** of portable computer **102**. Computer accessory **101** could also be attached to a different

face of portable computer **102**, or could attach in a way that involves more than one face of portable computer **102**.

[0018] The computer user can disengage computer accessory **101** from computer **102** without the use of tools by grasping grip recesses **113**, depressing release pins **116**, and pulling accessory **101** away from computer **102**. Other kinds of features may be used to attach and detach accessory **101** to and from computer **102**.

[0019] Figure 3 shows a cutaway perspective view of the interaction of hook features **110**, receiving features **111**, and release pins **116**. The view shown is taken along section A-A in Figure 2. Hook feature **110** snaps into undercut receiving feature **111**, holding accessory **101** against the bottom of portable computer **102**. Release pin **116** has been snapped into its channel and is restrained there by a raised feature **301** at its forward end. The computer user can actuate release pin **116** in the direction shown by pressing on its rearward end, forcing it against hook feature **110** so as to release hook feature **110** from receiving feature **111**. The other hook and receiving features shown in Figure 1 operate similarly. Thus release pins **116** provide a releasing mechanism for detaching computer accessory **101** from portable computer **102**. Computer accessory **101** and computer **102** may have more or fewer sets of attaching and releasing features than are depicted in the Figures.

[0020] Example computer accessory **101** also includes a power receptacle **114** for receiving power from an external source, such as, for example, a mains power outlet. A mains power outlet is one connected to the widely available power grid, often through a standard wall socket. In the United States, mains power is typically alternating current (AC), supplied at about 110 volts with a nominal frequency of 60 hertz. Some other countries use other voltages and frequencies, and other voltages are sometimes available in the United States as well. For the purposes of this disclosure,

a mains power outlet includes all of these variations and their equivalents. Receiving power from a mains power outlet also includes receiving power through a transformer or conditioning device connected to a mains power outlet. For example, many small electronic devices receive power from a small transformer designed to plug into a mains power outlet and supply AC power to the device at a reduced voltage, or to supply direct current (DC) power, also typically at a reduced voltage.

[0021] Figure 4 schematically shows how the connections inside computer accessory **101** may be made, and their interactions with example internal components of computer **102**. In this example embodiment, connections pass through computer accessory **101**, between docking connector **109** and mating connector **112**, to computer circuitry **402**. Computer circuitry **402** includes sufficient electrical contacts to service all of the communication ports. When docking connector **109** and mating connector **112** are engaged, battery **103** is connected with a charging circuit **404** inside computer **102**. Charging circuit **404** is also connected to the computer's internal battery **403**. Charging circuit **404**, re-charges both batteries if external power is available, and/or manages the use of power from the two batteries when the system is running on battery power. Power receptacle **114** is connected in parallel with a similar power receptacle **401** on computer **102**. Numerous alternative connection arrangements are possible. For example, computer accessory **101** could contain a USB hub, a device that enables the connection of several USB devices to a computer with only one USB port. In that case, docking connector **109** and mating connector **112** could comprise fewer contacts.

[0022] Figure 5 depicts a computer accessory **501** in accordance with another example embodiment of the invention. In this example embodiment, accessory **501** connects to a portable computer **502** through a cable **503** that emanates from

computer accessory **501**. A docking connector **504** at the end of cable **503** engages mating connector **505**. Computer accessory **501** comprises a battery **506**, shown in broken lines, and at least one communication port. The example computer accessory shown in Figure 5 includes three USB ports **577**, **508**, and **509**, as well as a modem port **510** and a LAN connection port **511**. Example computer accessory **501** also includes an external power connection **512**. Of course, other combinations of port connections are possible, and the port connections may be positioned differently on computer accessory **501** than is shown in Figure 5.